

Health Risk Information for Public Health Goal Exceedance Reports

The following tables summarize health risks for chemical contaminants in drinking water that have regulatory standards, or maximum contaminant levels (MCLs). Under the Calderon-Sher Safe Drinking Water Act of 1996, utilities are required to prepare a report for contaminants that exceed public health goals. The first report is due July 1, 1998, and subsequent reports are due every three years (Health and Safety Code section 116470 (2)[b]). The section states that the numerical health risk be presented along with the category of health risk, and a plainly worded description of these terms.

The Act also requires that the Office of Environmental Health Hazard Assessment (OEHHA) adopt “public health goals” (PHGs) based on health risk assessments using the most current scientific methods. As defined in statute, PHGs for noncarcinogenic chemicals in drinking water are set at a concentration “at which no known or anticipated adverse health effects will occur, with an adequate margin of safety.” For carcinogens PHGs are set at a concentration that “does not pose any significant risk to health.” PHGs provide one basis for revising MCLs, along with cost and technological feasibility. OEHHA in 1997 established the first 27 PHGs for 26 chemicals, as shown in Table 1.

The Act requires that for chemical contaminants with MCLs that do not yet have California PHGs, water utilities will use the federal maximum contaminant level goal (MCLG) for the purpose of complying with the requirement of public notification. MCLGs, like PHGs, are strictly health based and include a margin of safety. One difference, however, is that the MCLGs for carcinogens are set at zero because the U.S. Environmental Protection Agency (U.S. EPA) assumes there is no absolutely safe level of exposure to them. PHGs, on the other hand, are set at a level considered to pose no *significant* risk of cancer; this is usually a one-in-a-million excess cancer risk (1×10^{-6}) for a lifetime of exposure. Chemicals with MCLGs are presented in Table 2.

Health risk categories. The following information will be helpful for presenting the health risk categories in “exceedance reports.” The health risks shown in the tables are based on long-term exposures to low levels of contaminants as would occur with drinking water, rather than high doses from a single or short-term exposure. These are the first or most sensitive adverse effects that occur when chemical exposure reaches a sufficient level and duration to produce toxicity. Basing health goals to protect against these risks also protects against health risks that would occur from short-term exposures. For most health risk categories, the specific health outcome, or the organ or system that is affected, is also given. The health terms are given in nontechnical terms when possible, and the categories are described below.

Acute toxicity - adverse health effects that develop after a short-term exposure to a chemical.

Carcinogenic - capable of producing cancer.

Chronic toxicity - adverse effects that usually develop gradually from low levels of chemical exposure and that persist for a long time.

Developmental toxicity - adverse effects on the developing organism that may result from exposure prior to conception (either parent), during prenatal development, or postnatally to the time of sexual maturation. Adverse developmental effects may be detected at any point in the life span of the organism. The major manifestations include: (1) death of the developing organism, (2) structural abnormality (birth defects), (3) altered growth, and (4) functional deficiency.

Neurotoxic - capable of destroying or adversely affecting the nervous system, or interfering with nerve signal transmission. Effects may be reversible (for example, effects on chemicals that carry nerve signals across gaps between nerve cells) or irreversible (destruction of nerve cells).

Reproductive effects - the occurrence of adverse effects on the reproductive system of females or males that may result from exposure to environmental agents. The toxicity may cause changes to the female or male reproductive organs, the regulating endocrine system, or pregnancy outcomes. Examples of such toxicity may include adverse effects on onset of puberty, egg production and transport, menstrual cycle normality, sexual behavior such as sexual urge, and lowered fertility, sperm production, length of pregnancy, and milk production.

The table further notes whether the health risk category is based on human or animal data. Data on health effects of toxicants is usually obtained from studies on laboratory animals.

For more information on health risks: The adverse health effects for each chemical are summarized in each PHG document. These will be available on the OEHHA website (<http://www.calepa.cahtnet.gov/oehha>) or may be ordered in print. (Call OEHHA at 510/540-3063 for details.) Also, U.S. EPA has consumer and technical fact sheets on most of the chemicals having MCLs. For copies of the fact sheets, call the Safe Drinking Water Hotline at 1-800-426-4791, or explore the Office of Ground Water and Drinking Water's home page at <http://www.epa.gov/OGWDW/hfacts.html>.

Table 1: Health Risk Categories and Cancer Risk Values for Chemicals with California Public Health Goals (PHGs)

Chemical	Health Risk Category¹ (more specific information in parentheses)	California PHG (mg/L)²	Cancer Risk³ @ PHG	California MCL⁴ (mg/L)	Cancer Risk @ California MCL
Alachlor	carcinogenicity (cancer)	0.004	NA ⁵	0.002	NA
Antimony	chronic toxicity (shortened lifespan)	0.02	NA	0.006	NA
Benzo[a]-pyrene	carcinogenicity (cancer)	0.000004	1×10^{-6} (= one per million)	0.0002	5×10^{-5} (= 5 per 100,000)
Chlordane	carcinogenicity (cancer)	0.00003	1×10^{-6}	0.0001	3×10^{-6}
Copper	acute toxicity (gastro-intestinal effects, human data)	0.17	NA	1.3 (AL) ⁶	NA
Cyanide	chronic toxicity (thyroid effects)	0.15	NA	0.2	NA
Dalapon	chronic toxicity (kidney effects)	0.79	NA	0.2	NA

¹ Health risk category based on animal data unless otherwise specified.

² mg/L = milligrams per liter of water (PHGs are expressed in milligrams per liter for consistency with MCLs and MCLGs.)

³ Cancer Risk = theoretical 70-year lifetime excess cancer risk at the statistical upper confidence limit. Actual cancer risk may be lower or zero. Cancer risk is stated in terms of excess cancer cases per million (or fewer) population, e.g., 1×10^{-6} means one excess cancer case per million population; 5×10^{-5} means 5 excess cancer cases per 100,000 population.

⁴ MCL = maximum contaminant level

⁵ NA = not applicable. No cancer risk is calculated for chemicals considered “noncarcinogens.” For noncarcinogens, an exact numerical public health risk cannot be calculated. The PHG for these chemicals is set at a level which is believed to be without any significant public health risk to individuals exposed to that chemical over a lifetime.

⁶ AL = action level

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Chemical	Health Risk Category¹ (more specific information in parentheses)	California PHG (mg/L)²	Cancer Risk³ @ PHG	California MCL⁴ (mg/L)	Cancer Risk @ California MCL
Diethyl-hexyl-phthalate (DEHP)	carcinogenicity (cancer)	0.012	1×10^{-6}	0.004	3×10^{-7}
1,2-Dichloro-benzene	chronic toxicity (liver effects)	0.6	NA	0.6	NA
1,4-Dichloro-benzene	carcinogenicity (cancer)	0.006	1×10^{-6}	0.005	8×10^{-7}
2,4-Dichloro-phenoxy-acetic acid	chronic toxicity (liver and kidney effects)	0.07	NA	0.07	NA
Dinoseb	reproductive toxicity	0.014	NA	0.007	NA
Endothall	chronic toxicity (stomach effects)	0.58	NA	0.1	NA
Ethyl-benzene	chronic toxicity (liver effects)	0.3	NA	0.7	NA
Fluoride	chronic toxicity (tooth mottling, human data)	1	NA	1.4 to 2.4	NA
Glyphosate	chronic toxicity (kidney effects)	1	NA	0.7	NA

Lead	neurotoxicity (decreased learning ability, human data)	0.002	NA	0.015 (AL)	NA
Nitrate	chronic toxicity (methemo- globinemia, human data)	10 as N ⁷	NA	45 as NO ₃	NA
Nitrite	same as nitrate	1 as N	NA	1 as N	NA
Nitrate and Nitrite	same as nitrate	10 as N	NA	10 as N	NA
Oxamyl	chronic toxicity (weight loss)	0.05	NA	0.2	NA
PCP	carcinogenicity (cancer)	0.0004	1×10 ⁻⁶	0.001	3×10 ⁻⁶
Picloram	chronic toxicity (liver effects)	0.5	NA	0.5	NA
Freon 11	chronic toxicity (liver effects)	0.7	NA	0.15	NA
Freon 113	chronic toxicity (liver effects)	4	NA	1.2	NA
Uranium ⁸	carcinogenicity; chronic toxicity (cancer, human data; kidney toxicity)	2 pCi/L ⁹	1×10 ⁻⁶	20 pCi/L	1×10 ⁻⁵
Xylenes	neurotoxicity (effects on senses, mood and motor control, human data)	1.8	NA	1.75	NA

⁷ N = nitrate or nitrite-nitrogen

⁸ = Undergoing reevaluation

⁹ pCi/L = picocuries per liter of water

Table 2: Health Risk Categories and Cancer Risk Values for Chemicals without California Public Health Goals

Chemical	Health Risk Category¹⁰	U.S. EPA¹¹ MCLG¹² (mg/L)	Cancer Risk¹³ @ MCLG	California MCL¹⁴ (mg/L)	Cancer Risk @ California MCL
1,1,2,2-Tetrachloro-ethane	under review ¹⁵	none	NA ¹⁶	0.001	NA
1,1,1-Trichloro-ethane	reproductive toxicity (decreased number of offspring)	0.2	NA	0.2	NA
1,1,2-Trichloro-ethane	chronic toxicity (liver effects)	0.003	NA	0.005	NA
1,1-Dichloro-ethane	chronic toxicity (increased death rate of rats)	none	NA	0.005	NA
1,1-Dichloro-ethylene	chronic toxicity (liver and kidney effects)	0.007	NA	0.006	NA
1,2,4-Trichloro-benzene	chronic toxicity (effects on adrenal glands)	0.07	NA	0.07	NA
1,2-Dichloro-ethane	carcinogenicity (cancer)	0	0	0.0005	1.7×10^{-6}
1,2-Dichloro-ethylene (cis)	chronic toxicity (kidney effects)	0.07	NA	0.006	NA
1,2-Dichloro-ethylene (trans)	chronic toxicity (blood chemistry changes)	0.1	NA	0.01	NA

¹⁰ Health risk category based on animal data unless otherwise specified.

¹¹ U.S. EPA = U.S. Environmental Protection Agency

¹² MCLG = maximum contaminant level goal established by U.S. EPA

¹³ Cancer Risk = theoretical 70-year lifetime excess cancer risk at the statistical confidence limit. Actual cancer risk may be lower or zero. Cancer risk is stated in terms of excess cancer cases per million (or fewer) population, e.g., 1×10^{-6} means one excess cancer case per million population; 5×10^{-5} means 5 excess cancer cases per 100,000 population.

¹⁴ California MCL = maximum contaminant level established by California.

¹⁵ under review -- There is no MCLG or PHG for this chemical. A PHG will be adopted in the future, and risk category identified at that time.

¹⁶ No numerical public health risk is calculated for chemicals considered "noncarcinogens."

Table 2: Health Risk Categories and Cancer Risk Values for Chemicals without California Public Health Goals

Chemical	Health Risk Category¹⁰	U.S. EPA¹¹ MCLG¹² (mg/L)	Cancer Risk¹³ @ MCLG	California MCL¹⁴ (mg/L)	Cancer Risk @ California MCL
1,2-Dichloro-propane	carcinogenicity (cancer)	0	0	0.005	1×10^{-6}
1,3-Dichloro-propane	chronic toxicity (kidney effects)	none	NA	0.0005	NA
Aluminum	chronic toxicity (gastrointestinal effects, human data)	none	NA	1	NA
Arsenic (under review)	carcinogenicity (cancer, human data)	0	0	0.05	$1-2 \times 10^{-2}$
Asbestos	carcinogenicity (cancer, human data)	0	0	7 MFL ¹⁷	1×10^{-6}
Atrazine	neurotoxicity (loss of motor control)	0.003	NA	0.003	NA
Barium	chronic toxicity (cardiovascular effects, human data)	2	NA	1	NA
Bentazon (tentative)	reproductive toxicity and chronic toxicity (prostate and gastrointestinal effects)	0.02	NA	0.018	NA
Benzene	carcinogenicity (cancer, human data)	0	0	0.001	2.5×10^{-6}
Beryllium	developmental toxicity (slower growth in young animals)	0.004	NA	0.004	NA
Bromacil	under review	none	NA	none	NA
Cadmium	chronic toxicity (kidney effects, human data)	0.005	NA	0.005	NA

¹⁷ MFL -- million fibers per liter

Carbofuran	chronic toxicity (blood chemistry changes)	0.04	NA	0.018	NA
Carbon tetrachloride	carcinogenicity (cancer)	0	0	0.0005	1×10^{-6}
Chlorobenzene	chronic toxicity (liver, kidney and blood effects)	none	NA	0.07	NA
Chromium	chronic toxicity (blood, liver and kidney effects)	0.1	NA	0.05	NA
Dibromo-chloropropane (DBCP)	carcinogenicity (cancer)	0	0	0.0002	1×10^{-4}
Dichloro-methane	carcinogenicity (cancer)	0	0	0.005	1.7×10^{-6}
Diethyhexyl-adipate (DEHA)	developmental effects (slower growth in young animals)	none	NA	0.004	NA
Dioxin	under review	none	NA	0.00000003	NA
Diquat	chronic toxicity (eye, liver, kidney and gastrointestinal effects)	0.02	NA	0.02	NA
Diuron	under review	none	NA	none	NA
Ethylene dibromide	carcinogenicity (cancer)	0	0	0.00005	2×10^{-6}
Endrin	chronic toxicity and neurotoxicity (liver effects, convulsions)	0.002	NA	0.002	NA
Heptachlor	carcinogenicity (cancer)	0	0	0.00001	1×10^{-6}
Heptachlor epoxide	carcinogenicity (cancer)	0	0	0.00001	1.4×10^{-6}
Hexachloro-benzene	carcinogenicity (cancer)	0	0	0.001	5×10^{-5}
Hexachloro-cyclopentadiene	chronic toxicity (stomach lesions)	0.05	NA	0.05	NA

Lindane	neurotoxicity (central nervous system effects; human data)	0.0002	NA	0.0002	NA
Mercury	chronic toxicity and developmental toxicity (kidney damage, birth defects; human data)	0.002	NA	0.002	NA
Methoxychlor	reproductive effects (decreased number of offspring)	0.04	NA	0.04	NA
Molinate	reproductive effects (decreased number of offspring)	none	NA	0.02	NA
Methyl tertiary butyl ether (MTBE)	under review	none	NA	none	NA
Nickel	chronic toxicity (liver and heart effects)	0.1	NA	0.1	NA
Polychlorinated biphenyls (PCBs)	carcinogenicity (cancer)	0	0	0.0005	1×10^{-4}
Perchloro-ethylene	chronic toxicity (kidney toxicity) cancer	0	0	0.005	7×10^{-6}
Perchlorate	under review	none	NA	none	NA
Radionuclides (radium, strontium 90 and tritium)	under review	none	NA	Ra, 5 pCi/L; Sr90, 8 pCi/L; tritium, 20,000 pCi/L	NA
Selenium	chronic toxicity (hair and nail changes, skin lesions, nervous system effects; human data)	0.05	NA	0.05	NA
Silvex	under review	none	NA	0.1	NA
Simazine	chronic toxicity (weight changes, blood effects)	0.004	NA	0.004	NA
Styrene	chronic toxicity (liver and blood effects)	0.1	NA	0.1	NA

Trichloro-ethylene	carcinogenicity (cancer)	0	0	0.005	6×10^{-6}
Thallium	chronic toxicity (blood chemistry changes)	0.0005	NA	0.02	NA
Thiobencarb	chronic toxicity (body weight changes and enzyme activity changes)	none	NA	0.07	NA
Toluene	developmental toxicity (decreased liver and kidney weight)	1	NA	0.15	NA
Toxaphene	carcinogenicity (cancer)	0	0	0.003	1×10^{-4}
Trihalomethanes	under review	none	NA	0.1	NA
Vinyl Chloride	carcinogenicity (cancer, human data)	0	0	0.0005	2.5×10^{-6}